THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

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72% of Space In Cleveland Show Reserved

Seventy-two per cent of the exhibit space in the War Production Edition of the National Metal Exposition was assigned to more than 165 manufacturers on June 3, two weeks after the first announcement that this event would be held in Cleveland's Public Auditorium during the week of Oct. 12.

"This is the largest advance reservation of exhibit space in a two-week interval in the 24-year history of this event", said W. H. Eisenman, managing director of the Exposition, and national secretary of the A.S.M.

"This is just one more indication of the all-out effort of the metal industry to cooperate in educational and training work that will speed production for Victory. The big majority of the manufacturers taking space indicated they would be on hand primarily to contribute their knowledge and experience on a free consulting basis", according to Mr. Eisenman.

The four societies that are planning broad technical sessions in connection with this event are the American Society for Metals, the American Welding Society, the Wire Association and the Iron and Steel and Institute of Metals Divisions of the American Institute of Mining and Metallurgical Engineers.

Practical Uses of Austempering Keep Pace With Theory

Reported by G. L. White
Editor, Canadian Metals & Metallurgical Industries

Ontario Chapter — The final technical meeting for the 1941-42 season was held at the Leonard Hotel, St. Catharine's, Ont., on Friday, May 15. The speaker, H. J. Elmendorf, research engineer, American Steel and Wire Co., Cleveland, gave a very interesting and practical address on "Austempering", illustrated with many slides. The newly elected chapter chairman, J. F. Thomlinson of Toronto Hydro-Electric System, presided.

Mr. Elmendorf briefly outlined the development of austempering, starting with the initial work of Bain and Davenport about 1929. Since the original S-curve was charted, approximately 40 others have been prepared on various types of heat treatable carbon and low alloy steels.

Practical developments in the field have kept pace with theory and austempering is now employed for the heat treatment of a large number of steel parts of light section.

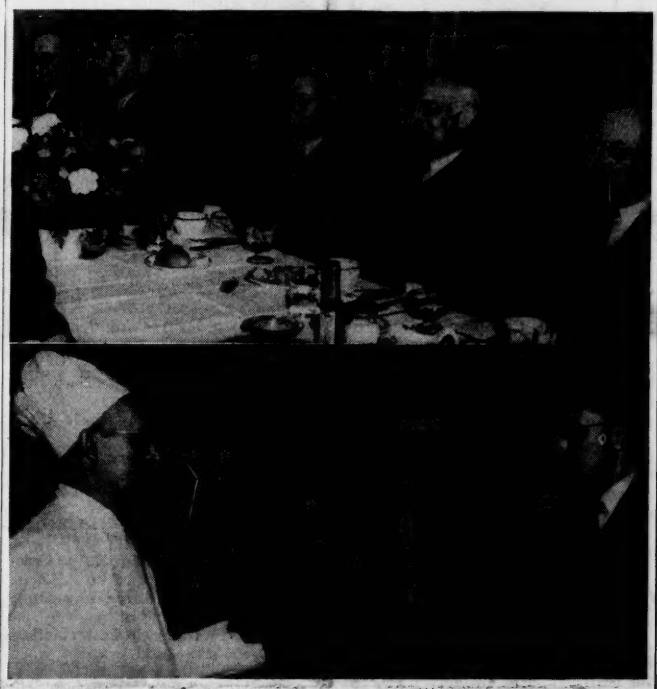
Photomicrographs were shown to illustrate the progress of the austenite-pearlite transformation and of the austenite-bainite transformation. In austempering the aim is to secure 100% bainite.

While they are sometimes confused, bainite and martensite may easily be distinguished by properly prepared photomicrographic specimens, the bainite being more acicular in structure.

Coarsening of grain or the addition of alloys, such as manganese, molybde-

(Continued on Page 2)

A. S. M. National Officers at Canton-Massillon



Found at Canton-Massillon Chapter's National Officers' Night Were, Left to Right: L. A. Zeitz, Chapter Secretary; National Secretary W. H. Eisenman; K. F. Schmidt, Chapter Chairman; National President Bradley Stoughton; and R. J. Schott, Vice-Chairman of the Canton-Massillon Chapter. Below: Henry With, chef at the Elks Club, is presented with an honorary chapter membership and title of "chef metallurgist" by Chairman Schmidt.

Mining Scholarships Offered at Univ. of Ill.

Three scholarships in mining engineering in the Department of Mining and Metallurgical Engineering at the University of Illinois are available to residents of the State of Illinois. Each of the scholarships has an annual award of $100 and continues for four years of study.

Two of these are known as the Peabody Coal Co. scholarships and are preferably restricted to employees, or the sons of employees, of the Peabody Coal Co. The third is the Illinois Mining Institute Scholarship, which is limited to young men from mining communities within the State of Illinois.

Further information may be secured from either the secretary of the Illinois Mining Institute, 28 East Jackson Blvd., Chicago, or from the Department of Mining and Metallurgical Engineering, University of Illinois, Urbana, Ill.

Mitchell Gives Facts On Alloy Conservation

Reported by Colin Chisholm
Salesman, Columbia Steel Co.

Oregon Chapter—Following the business meeting on May 6, John Mitchell of the Carnegie-Illinois Steel Corp. spoke on "Selection and Conservation of Alloying Elements Used in Steels".

Mr. Mitchell, who is at present the chairman of the Alloy and Alloy Substitutes Committee of the American Iron and Steel Institute, gave some extremely interesting statistics on the alloy situation. He described new methods by which the proper use of substitutes could be determined and emphasized the need for the proper heat treatment of all alloy steels to procure the best properties.

Stoughton Discusses Status of War Effort

Reported by J. M. Gotshall
Assistant Chief Chemist, Timken Steel and Tube Division

Canton-Massillon Chapter—The National Society's president, Prof. Bradley Stoughton, brought to the Chapter a very interesting and timely talk on "Metallurgy and Its Relation to the Nation's War Effort."

The talk was very instructive and complete in its scope, casting a somewhat brighter light on the critical materials situation, bringing out that with continued husbanding, we will maintain a satisfactory condition.

Bill Eisenman, the national secretary, in a short talk after the dinner, brought information concerning the Society's activities in general, news of other chapters and of the War Products Advisory Committees.

Opportunity was taken during the dinner session to honor the 19 sustaining members of the Chapter, a representative of each being presented to the group. Henry With, chef at the Elks Club, where the meetings have been held for the past several years, was awarded an honorary chapter membership and given the title "Chef Metallurgist" by Chairman Karl F. Schmidt.

WPAC's to Have Information on New NE Steels

At the suggestion of the War Production Board, the War Products Advisory Committees of the A.S.M. will act as local clearing houses for information relative to the new National Emergency Steels (NE series) received by the Board at Washington.

Inasmuch as the WPAC's are already organized and are composed of highly trained and technical men, it was felt that they could interpret and transmit the material which is already available on these steels. They would serve as a close contact and consultant with the manufacturing industries in the communities within the chapters' sphere of influence and thus assist in securing industry acceptance of these steels.

In those chapters where the WPAC has not as yet been organized, the regular chapter officers of the A.S.M. will assist in this program.

Special summer meetings devoted to

(Continued on Page 2)

Emergency Steels Data Collected in Booklet Form

INFORMATION concerning the new National Emergency steels that has been published in METAL PROGRESS has been collected and condensed in a 32-page booklet and forwarded to the members of the various A.S.M. War Products Advisory Committees. This material will be used by the committees to assist them in preparing for special meetings on the NE steels.

While the booklet has been prepared for the use of the WPAC members, if there should be a demand for additional copies from other sources they will be supplied at cost—25 cents. Requests accompanied by stamps or coin should be sent to American Society for Metals, 7301 Euclid Ave., Cleveland.

Non-Technical Meeting Covers Financial Trends

Reported by H. E. Hostetter
Metallurgical Engineer, Climax Molybdenum Co.

St. Louis Chapter — At the regular May meeting it was revealed that the local A.S.M. membership is keeping its collective nose within close proximity of the proverbial grindstone. This fact was established by the slightly circumstantial evidence of a record low turnout for the non-technical talk offered in lieu of the usual technical session.

W. C. Gordon, Jr., assistant treasurer of the General American Life Insurance Co., St. Louis, spoke on the subject, "Financial Trends at the End of the Present War". Without once mentioning austenite, grain size or Brinell hardness, Mr. Gordon gave an interesting talk on his chosen topic and on the possibilities of union with Great Britain.

It was agreed by those present that the sub-title, "Controlled Atmospheres", would have constituted only a small fraud and might have resulted in a larger attendance.

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RAY T. BAYLESS.....*Editor*
M. R. HYSLOP.....*Managing Editor*

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Outline, References Add to Value of Talk

Reported by Paul Ffield
Materials Engineer, Bethlehem Shipbuilding Division

Boston Chapter—Friday, May 1, was the last meeting of the current season. A colored motion picture was shown after dinner of the "Thaw Motor Expedition to the Near East". The photography was beautiful and the countries visited were ideal subjects for kodachrome.

Dr. Walter M. Saunders, Jr. presented his paper on the "Hardenability of Steels." Walter needed no introduction to the Boston Chapter, where he is well-known, for, even though he lives in Providence, he consistently attends all Boston Chapter meetings.

Dr. Saunders presented his talk in an original way. He first of all handed out to each member a mimeographed outline, which was divided into several subdivisions, each dealing with some specific phase of hardenability. A talk of this type requires considerable reference to the work of outstanding investigators, and Walter completed his outline with a bibliography.

After the discussion period, Chairman Burnett turned the gavel over to the incoming chairman, Amos J. McDuff.

After the meeting was closed, the Colonial Beacon Oil Co. stated that there was another reel of colored movies for those who wanted to stay. Without exception, everyone stayed for the second show.

Tri-City Hears Bates on "Plastics for Metallurgist"

Reported by James C. Erickson
Deere & Co.

Tri-City Chapter — In a friendly way, G. T. Williams introduced Dr. A. Allan Bates to the Tri-City Chapter as a man all metallurgists should beware of. Despite this handicap, Dr. Bates of the Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., won the admiration of his audience by his top-notch address "Plastics for the Metallurgist" given at the May meeting held at the Fort Armstrong Hotel in Rock Island, Ill.

Dr. Bates' very interesting talk lived up to the reputation he has earned in presenting it before other chapters of the Society; it will not be reviewed again here.

Over 2000 Varieties Of Files Now in Use Says Nicholson Supt.

Reported by Walter M. Saunders, Jr.
Consulting Chemist and Metallurgist

Rhode Island Chapter — Scheduled meetings for this year were concluded on April 1, when John E. Wiggins, superintendent, Nicholson File Co., Providence, and past chairman of the Rhode Island Chapter, spoke on "Practical Metallurgy in the Manufacture and Use of Files".

Outside of the metallurgical features of file making, which are naturally foremost in the minds of most A.S.M. members, it was interesting to hear Mr. Wiggins describe the history of files. Hand-made files were the only ones available until about the middle of the last century; attempts at mechanical methods of cutting the teeth by a chisel were not successful until a machine was invented in 1864 by W. T. Nicholson, the founder of the Nicholson File Co.

Other methods of cutting teeth are used, such as broaching, milling, and knurling, but Mr. Wiggins stated that in at least 90% of all files made, the teeth are cut by a chisel.

Since 1864 many improvements have naturally been made, and types of files have been increased, until now over 2000 varieties exist. Terms like single cut, double cut, up-cut, over-cut, and bastard may sound like a prize fight, but to the file maker they denote kinds of files.

Extreme care is taken in inspection of the high carbon file steel as it is received, and this includes macroscopic examination for soundness, chemical analysis, and microscopic examination for distribution of carbides. The last mentioned feature is the cause of the greatest concern not only in the raw stock, but also in the finished product, and proper distribution of carbides receives a great deal of attention.

Spheroidizing annealing, forging, machining or cutting, and hardening the files in a lead bath, all follow accepted practices.

As the coffee speaker at the dinner preceding the meeting, Ensign Robert Wetherill described the modern 20-mm. anti-aircraft guns produced by the A.O.G. Corp., under the title "Death to the Dive Bomber".

WPAC's Are Information Headquarters on NE Steels, Special Meetings Planned

(Continued from Page 1)

the NE steels will probably be held by the A.S.M. and War Products Advisory Committees in most chapter areas.

The May issue of THE REVIEW published a bibliography of available information on NE steels that has appeared in recent issues of METAL PROGRESS. This is brought up to date below.

Substitute Steels

National Emergency Steels
- List of Compositions — March 1942, p. 344.
- (Revised S.A.E. and A.I.S.I. steels—March 1942, p. 345.)
- Substitutions for Carburizing Grades —March 1942, p. 344.
- Substitutions for Semi-Thorough Hardening Grades—March 1942, p. 347.
- Substitutions for Thorough Hardening Grades—March 1942, p. 348.
- National Emergency Steels NE 8600 to 8900—June 1942, p. 793.

Substitutes for Nickel Steels — Sept. 1941, p. 300.
Manganese-Molybdenum Steels — Dec. 1941, p. 906.
High Strength Low Alloy Steels—Nov. 1941, p. 782.
Making the Most of Carbon Steels — Oct. 1941, p. 451.

Basis of Substitutions

General Considerations—Dec. 1941, p. 881.
Considerations Involving Shop Practices—Sept. 1941, p. 289.
Metallurgical Considerations—June 1941, p. 721.
- Jominy's End-Quench Test; Method —Dec. 1941, p. 911.
- Jominy's End-Quench Test; Interpretation—Nov. 1940, p. 685.
- Jominy Curves for NE Steels—March 1942, p. 342.

The Alloy Situation

Function of Alloys in Steel—Oct. 1941, p. 464.
Supply of Manganese—Aug. 1941, p. 167; Sept. 1941, p. 295.
- Molybdenum—July 1941, p. 44; Aug. 1941, p. 169.
- Nickel—March 1941, p. 299; Sept. 1941, p. 295.
- Chromium—Sept. 1941, p. 294; Oct. 1941, p. 676, 686; April 1942, p. 503.
- Vanadium—Sept. 1941, p. 297.

Humor Seasons Davenport's Campbell Lecture; New Data on S-Curves Included

Reported by Walter G. Patton
Climax Molybdenum Co. Laboratory

Detroit Chapter — Sustaining Members Night was observed at the April meeting. Featured speaker of the evening was E. S. Davenport of the U. S. Steel Corp. Laboratories.

Mr. Davenport's now justly famed discourse on the S-curve has been reviewed in this publication before. However, not only the subject matter but the speaker's ability to tell his story improves with repetition.

The solemnity of the Campbell Memorial lecture was noticeably gone in Mr. Davenport's Detroit appearance; his talk was well-seasoned with humor and he more than made good in his efforts to compete successfully, as he put it, with the "overstuffed upholstery" in the Rackham Building auditorium.

Robert M. Parke of Climax Molybdenum was technical chairman.

Mr. Davenport has added effectively to the material which first appeared in his Campbell Memorial Lecture. The charts used to depict the progressive effects of the several alloying elements and grain size have been improved and condensed. Appropriate information showing the effect on hardenability of bringing all the carbides into complete solution in the austenite has been added.

As Mr. Davenport inferred, the S-curve may be looked upon as a sort of portrait of the steel from which we can predict, at least in a qualitative way, how that particular steel will respond to a given set of heat treating conditions.

Students of the S-curve were unrestrained in their applause of Mr. Davenport's talk.

As an added attraction, the Detroit group saw Bell Aircraft Corp.'s thrilling technicolor film of the Airacobra fighter plane in action. Special maneuvers, target practice, diving attacks and other views of this amazing fighting machine proved to everybody's satisfaction that the Airacobra is indeed as bad luck to Hitler and Company as it is a credit to the engineers who designed and the workmen who built it.

37-Mm. Shell Gives Example of Close Ordnance Inspection

Reported by David F. Carter
Asst. Met., Diamond Chain & Mfg. Co.

Indianapolis Chapter — Speaker of the April meeting was Major Lewis B. Blakeney of the Cincinnati Ordnance District. He covered the subject of "Ordnance Inspection" from the viewpoint of both the Army and the manufacturer.

Major Blakeney outlined the steps taken in the training of civilian inspectors and their duties. He also told how these inspectors are under the direct supervision of Army officers of the Ordnance branch with industrial experience. The Ordnance branch of the Army has supervision of the production of the soldiers' fighting weapons.

Using a 37-mm. case and shell as an example, Major Blakeney told of the number of drawings and gages for each component of the round, and explained the reason for very close tolerances on some of the parts.

The inspection of these individual parts is a most important job and should be done by adequately trained persons. Most trouble is encountered in plants which have never had an inspection force or where the inspection of work is a portion of the production division.

The perfect set-up would be for the company's inspection department to reject all parts that do not meet specifications. However, this is not always feasible and at this point the Ordnance inspector enters the picture.

On rejected parts where salvage is possible it is necessary that an officer of Ordnance be consulted and his consent obtained to waive or alter any portion of Army specifications before rejected parts are reclaimed.

Austempering Keeps Pace With Theory

(Continued from Page 1)

num, chromium, and nickel, moves the S-curve to the right, hence increasing maximum hardenable sizes, but in practice grain should not be coarsened to achieve this result. There is considerable variation from 0.148 to approximately 1 in. in the maximum diameter which may be austempered successfully, depending upon the nature of the steel being treated.

Austempering is carried out in practice by heating parts to the proper temperature and quenching in salt or lead baths held at the desired transformation temperature.

Applications of austempering are varied and remarkable results have been obtained in improvement of properties in many cases. Safety shoe toe caps when austempered give increased compression and impact tests over caps heat treated by normal means.

With bicycle type roller chains very much harder parts were produced by austempering, reducing abrasion without sacrificing resistance to crushing. Other typical applications include billet chipping chisels, textile machine parts and fencing foils.

Many operators favor the salt bath quench because the parts drop through the salt where they would float on lead, although it is conceded that slightly better results are obtained with the lead bath. With the salt bath it has been found that the temperature is very uniform and that less control is required than was at first expected.

Spectrograph Developed by Need for Speed

Reported by Roy Huitema
Laboratory Chemist, Metal & Thermit Co.

Calumet Chapter—On April 21, the regular meeting was devoted to a symposium on spectrographic analysis. The speakers were John A. Schuch, Harry W. Dietert Co., Detroit, and Dr. W. C. Pierce, University of Chicago.

Mr. Schuch discussed the construction and operation of the spectrograph, while Dr. Pierce covered theory and practice of spectrographic analysis.

The demand for speed and more speed in chemical analysis, especially in the steel industry, has resulted in the development of methods of quantitative spectrographic analysis. In some cases complete analysis of a sample may be reported in 8 to 15 min. after the sample reaches the laboratory with an accuracy of from 2 to 5% of the amount of the constituents analyzed for.

Grating Spectrographs Satisfactory

Because of the high cost of large quartz crystals and necessary optical systems used in prism type instruments, grating spectrographs have been developed which are satisfactory for the qualitative and quantitative analysis of ferrous and non-ferrous materials. Because of their freedom of lenses and other reflecting surfaces, the intensity of their spectra is comparable with that from Littrow type spectrographs.

Gratings are now ruled which give spectrums that are practically free of ghost lines; and when these lines do appear they are so spaced as to be easily distinguished, appearing as faint companion lines to the principal line and spaced equal distances on either side. In any case the intensity of the ghost lines is never more than 0.2% of the parent line.

D. C. Arc for Qualitative Analysis

Three methods are employed in producing the spectrum from a sample: The direct current arc; the alternating current arc; and the spark discharge. Each has its place, and each has its limitations.

The direct current arc tends to heat the electrode to a point where fractional distillation of component elements takes place. The more volatile elements are partly depleted and after a short time their spectral lines become weaker than would be expected from the true composition of the sample. D. C. arc excitation is best suited for qualitative analysis.

The controlled A. C. arc is in general more satisfactory and results from this source are more reproducible than from the D. C. arc. Because of its good reproducibility, A. C. arc excitation is used for the quantitative determination of elements that are present in less than 0.50% of concentration.

Use of Spark Spectra

Spark spectra are different from arc spectra in that different lines are brought out by this method of excitation. Spark excitation is usually employed for quantitative analysis, especially where the concentration of the elements being determined is greater than 0.10%.

Quantitative determinations are made by measuring the density of spectral lines of the element in question and comparing their density with lines of the same element in a similar sample of known composition.

Monte Carlo Party Follows Annual Meeting

Lined up at the Gaming Table Spending Their Stage Money at the Annual Meeting of the Northwest Chapter Are, Left to Right: Leo Brom, Student, University of Minnesota; Dr. George Priester, University of Minnesota, Past Chairman; Al Leonard of Superior Plating & Rustproofing Co.; R. W. Bingham, American Hoist & Derrick Co., Chapter Chairman; Gordon W. Johnson, American Hoist & Derrick Co.; and F. H. Faber, Despatch Oven Co. Max Acker, Western Alloyed Steel Castings Co., played for the house.

Members Cash Winnings For Defense Stamps

Reported by Charles A. Nagler
Instructor, University of Minnesota

Northwest Chapter — The twenty-third Annual Meeting was held at the Covered Wagon in downtown Minneapolis, and took the form of a dinner at which new officers were elected.

The officers were introduced but no speeches were made. The secretary presented his financial report and a unanimous ballot was cast to purchase a $1000 defense bond.

After dinner the employees' cast of the Northern States Power Co. gave a skit entitled "Mother Buy a Bond" which was thoroughly enjoyed.

The party planned for the evening was of the Monte Carlo type. Each member was given a definite amount of stage money and played against the house. At the end of the evening the members cashed in their stage money winnings for defense stamps. The largest amount received $10, second largest $7.50, and third $5.00.

Internal Stress Shown As Cause of Failures

Reported by F. N. Meyer
Technical Supervisor, Waterbury Branch, Amercian Brass Co.

New Haven Chapter—G. R. Brophy, metallurgist of International Nickel Co., Inc., spoke on "Some Interesting Metal Investigations" at the April meeting. The speaker was introduced by M. J. Weldon, metallurgist of Henry G. Thompson & Son Co.

Mr. Brophy referred particularly to failures in which internal stresses are contributing causes. He explained, with the aid of slides, the cause of heat checks and the effect of increasing carbon content in increasing the tendency to crack under conditions of rapidly applied heat.

The speaker mentioned the effect of hydrogen in causing embrittlement and pointed out that an acid etch and subsequent embrittlement could be used as a test for internal stresses in steel.

Failures in iron or steel have been caused by stresses set up by corrosion products, by carbide precipitation and by molten metals. Penetration by molten metal at grain boundaries was attributed to the disorganized arrangement of atoms between crystals.

Principle of Furnace Brazing Depends On Capillary Action

Reported by Richard Grinndal
International Harvester Co.

Chicago Chapter — The regular monthly meeting on April 9 was "Non-Ferrous Night," and Harlan M. Webber of the General Electric Co. spoke on "Electric Furnace Brazing."

The meeting opened with the showing of the Aluminum Co. of America's motion picture, "Unfinished Rainbows", which dramatized the discovery of the present method of producing aluminum and the growth of the aluminum industry.

Mr. Webber was introduced by D. E. Wilson, chief metallurgist for the Studebaker Corp., Aviation Division. Mr. Webber's talk, illustrated by slides, dealt with the principles involved in electric furnace brazing, methods of applying the brazing metal, methods of holding work during the brazing operation, flux, atmosphere control and types of furnace installations.

Successful brazing depends on capillary action of the molten brazing metal, which flows through the joints of the pieces being joined. In order to obtain this capillary flow the joints must be sufficiently snug to allow a small space, but not too tight to obstruct the flow of the brazing alloy.

Pure copper, brasses or silver solders may be used for brazing, depending on the brazing temperature desired. Copper, which flows very readily in the molten state, is commonly used for brazing steel sub-assemblies, but is sometimes undesirable because of the high temperature required. For low temperature work the silver solders are most suitable.

Several methods of applying brazing metal were shown, including the use of wire in special grooves, powder, and fixtures for holding work during the brazing operation.

Oxidation is prevented by the use of a controlled atmosphere, sometimes augmented by flux, such as borax. Several types of gas generators are in use in brazing installations.

Several samples of brazed parts, illustrating the use of different solders and several brazing methods, were exhibited.

Bessemer Steel Quality Control Instantaneous

Reported by D. M. Horner
Superintendent No. 1 Forge
Harrisburg Steel Corp.

York Chapter—The annual Harrisburg meeting was held April 8 at the Colonial Country Club. An excellent dinner was topped off by Jones and Laughlin's beautiful technicolor movie "The Bessemer in Operation".

The technical session which followed was featured by a talk by Jones and Laughlin Steel Corp. metallurgist, Y. J. Bruce, who discoursed on "The Use of the Photo-Electric Cell in Acid Bessemer Steel Making". Mr. Bruce's talk was well illustrated by lantern slides.

Mr. Bruce stated that the principal difficulty in attempting quality control of bessemer steel is the rapidity of the process itself, since the blower has only seconds to act against minutes by the open-hearth process. This made it necessary that a controlling mechanism be instantaneous in action and desirable that a permanent record be kept of conditions throughout the blow.

Spectroscope First Used

Attempts at bessemer quality control started as early as 1868 when trials were made at analyzing the flame by a spectroscope and have continued periodically to the present time. However, the present method is the first to meet with general success.

The luminous energy of the entire flame is measured through suitable filters by a photo-electric cell. This energy is amplified and its amounts recorded on a chart.

The amount is relatively small during the silicon blow but increases rapidly to a sustained maximum with the carbon blow, until the carbon is reduced to about 0.15%, when it drops very rapidly, reaching the end point of the blow at about 0.04% carbon in a period varying from a few seconds to half a minute.

The end point is indicated by a slightly reduced rate in the reduction of luminous energy, and unless the vessel is turned down at that point further blowing will result in the formation of excessive amounts of FeO.

Time Controlled Within 6 Sec.

An attempt is made to control the time required for turning down the converter after the end point is reached to not over plus or minus 3 sec. from an optimum time which results in a minimum amount of rejections in fabrication.

Thus, with composition control of the molten metal charged and pressure control of the air blown, this method permits duplication of temperature and chemistry from one bessemer heat to the next, which in turn results in duplication of physical properties providing processing and fabrication are also identical.

Mr. Bruce concluded by emphasizing the fact that bessemer steel, at times in the past much maligned, is actually superior in quality when well made to other steels for many applications, especially for those requiring machinability, crush tests, corrosion resistance, cold work and fatigue endurance. This realization has prevented further decline in bessemer steel production in recent years and may easily result in increased production in the immediate and also the post-war future.

ASM-WAR PRODUCTS ADVISORY COMMITTEES

WAR PRODUCTS ADVISORY COMMITTEES have been organized by the local chapters of the American Society for Metals as a *free* advisory service for the metal producing and metal working industries. These ASM-War Products Advisory Committees meet regularly. Every manufacturer of war products is invited to avail himself of these meetings.

If you have a problem, do not hesitate to get in touch with your local committee. Write or phone the coordinator, chairman, secretary or problem recorder as indicated in the list of committees on this page. Complete personnel of the committees has been published in previous issues of THE REVIEW. Personnel of newly formed committees is shown on page 5 opposite.

The work of the ASM-War Products Advisory Committees is solely a contribution to present war-time efforts. You need not be a member of the American Society for Metals to obtain this service. *You will not be solicited for membership.* This is a sincere effort on the part of the chapters of the ASM to make a valuable contribution to "Ultimate Victory".

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New Haven ASM-WPAC

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Ansonia 3600

J. C. Huston
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Bridgeport 3-3161

C. E. Littell
New Haven Area Problem Recorder
Koppers Conn. Coke Co.
New Haven 4-1681

Roy E. Peterson
Norwalk Area Problem Recorder
The E. H. Hotchkiss Co.
Norwalk 6-1664

Robert C. LeMay
Waterbury Area Problem Recorder
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Pittsburgh Chapter ASM-WPAC

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Solvay Process Co.

J. R. MacAllister, *Recorder*
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Toledo Group ASM-WPAC

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231 Huron St., Toledo, Ohio
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Tri-City Chapter ASM-WPAC

H. N. Bristow, *Chairman*
Deere & Mansur Works
Moline, Ill.
Moline 3400

PERSONNEL OF NEWLY FORMED WPAC'S

Cincinnati ASM-WPAC

Sol Einstein, Vice-President, Chief Engineer, Cincinnati Milling Machine Co.; R. S. Diserens, Chief Engineer, Cincinnati Shaper Co.; W. B. Stoddard, Jr., Research Chemist, Champion Paper & Fiber Co.; Ralph J. Stolle, General Manager, Stolle Corp.; William Mitchell, President, Mitchell Steel Co.; Harry C. Ballmann, Fuel Engineer, Island Creek Coal Co.; L. F. Walz, Fuel Engineer, Gulf Refining Co.; Wm. M. Ball, Jr., Foundry Superintendent, Edna Brass & Mfg. Co.; John B. Caine, Metallurgist, Sawbrook Steel Castings Co.; J. D. Judge, Metallurgist, Hamilton Foundry & Mfg. Co.; F. Pfefferle, Chief Engineer, Cincinnati Shaper Co.; H. C. Murrer, President, Modern Tool Co.; Charles Sloan, Metallurgist, Andrews Steel Co.; N. M. Salkover, Vice-President, Queen City Steel Treating Co.; N. C. Strohmenger, Metallurgist, Tool Steel Gear & Pinion Co.; H. Stanley Binns, Metallurgist, Cincinnati Milling Machine Co.; T. A. Waltz, President, Cincinnati Steel Treating Co.; R. O. McDuffie, Professor of Metallurgy, Dept. Chemical Engineering, University of Cincinnati; Earl Dickman, Assistant Metallurgist, Cincinnati Milling Machine Co.; Hans Ernst, Director Research, Cincinnati Milling Machine Co.; Mario Martelotti, Research, Cincinnati Milling Machine Co.; Alfred Kullman, Assistant Works Manager, American Tool Works Co.; Austin J. Smith, Metallurgist, The Lunkenheimer Co.; Walter J. Klayer, Metallurgist, The Aluminum Industries Co.; L. A. Wolff, Retired; Charles E. Somogyi, Production Manager, Cincinnati Milling Machine Co.; R. C. Tackenberg, Shop Organization, The Heekin Can Co.; Wm. O. Anshutz, General Manager, The Cincinnati Gear Co.; Joseph Merke, Secretary, Plastic Moulding Corp.; D. M. Strauchen, General Superintendent, Cincinnati Milling Machine Co.; John W. Bolton, Chief Chemist and Metallurgist, The Lunkenheimer Co.; H. D. Sturges, Metallurgist, Wright Aeronautical Corp.; A. J. Sikora, Charge of Research, Wright Aeronautical Corp.; Walter W. Petry, Maintenance Engineer & Research, Cincinnati Milling Machine Co.; A. L. Hartley, Metallurgist, The R. K. LeBlond Machine Tool Co.; George F. Lockeman, Engineer, Procter & Gamble Co.; A. E. Taylor, Research Engineer, American Rolling Mill Co., Middletown, Ohio; Procter Thomson, Chemical Division, Procter & Gamble Co.

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Electrical Division
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Metallurgical Department
Ingersoll-Rand Co.
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A. O. Crobaugh, Laboratory Assistant, Ingersoll-Rand Co.; H. S. Lewis, Vice-President, Parish Pressed Steel Co.; L. H. Scheifele, Metallurgist and Tool Engineer, Reading Railroad Co.; B. F. Shepherd, Manager, Rock Drill Division, Ingersoll-Rand Co.; J. M. Weil, Assistant Superintendent, Ingersoll-Rand Co.; L. Wilson, American Chain & Cable Co.; Metallurgical Department, Carpenter Steel Co.; Metallurgical Department, Bethlehem Steel Co.

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Los Angeles ASM-WPAC

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Northwestern Pennsylvania Chapter ASM-WPAC

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John P. Beal, Jr., *Chairman*
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Titusville 243

Arsenal Inspectors Speak at Worcester

Leaders at the April Meeting of the Worcester Chapter Held in Alden Memorial, Worcester Polytechnic Institute, Were, Left to Right: Paul F. Pfau of Wyman-Gordon Co., Nominated Chairman of the Chapter; Capt. John P. Walsted, Chief Inspector at Watertown Arsenal, and Capt. Irving H. Comroe, also of the Watertown Arsenal Inspection Department, Who Were the Principal Speakers; and Thomas C. Bradford of the F. E. Anderson Oil Co., Portland, Conn., Technical Chairman for the Evening.

Paper on Heat Flow Contains Material on Practical Application

Reported by H. E. Hostetter
Metallurgical Engineer, Climax Molybdenum Co.

St. Louis Chapter—With a conscious contempt for the prophet-home town adage, the St. Louis Chapter gave honor to one of its own members, R. C. Tittel of Owens-Illinois Glass Co., Alton, Ill., at the regular April meeting.

Mr. Tittel presented a paper, "Heat Flow in Metals," based on the series of lectures given by Dr. J. B. Austin at last fall's Metal Congress. In addition to an able summary of the lecture series, Mr. Tittel gave some interesting supplementary material on practical applications of heat flow.

Heat is a form of energy and as such can be perceived and measured only by its effects. Although heat can be transferred by conduction, convection and radiation, it is conduction that is of most interest to metallurgists because of its variation among metallic materials.

Thermal conductivity is the ability of a body to conduct heat. There are many striking similarities between electrical conductivity and thermal conductivity because each is dependent upon the number of free electrons and the mean free path of the electrons.

Applying these principles to metallurgical facts, it is found that because the alloying of pure metals results in the shortening of the mean free path, alloying lowers the thermal conductivity. In general the separate effects of alloying elements in lowering thermal conductivity are additive.

The conductivity of a compound is usually less than that of the component metals. In binary systems of incomplete solid solubility, as the zinc-tin system, it is found that the thermal conductivity changes almost linearly, decreasing from zinc to tin.

A point for the metallurgist to keep in mind is th[e] the thermal resistance at the surface of metals oftentimes is a controlling factor in heat flow. Oxides, scale, insulation and films are bodies of high thermal resistance.

In the annealing of a stack of steel sheets, it is found that practically all of the heat is conducted from the edges rather than from sheet to sheet.

WAR PRODUCTS EDITION of National Metal Exposition and 24th National Metal Congress, Cleveland, Oct. 12 to 18. PLAN TO ATTEND!

Michigan Tech Sponsors Metallurgical Exhibits

Reported by Donald R. Mathews
Michigan College of Mining & Technology

Michigan Tech Chapter took charge of all Metallurgy Department exhibits at the biennial Engineering Show, May 22 and 23. Exhibits of interest to the public were: Heat Treating, Electroplating, Pyrometry, Assaying, Metallography, and X-rays.

A representative of the Metallizing Corp. of America demonstrated how crankshafts and other parts may be built up by metal spray. The colored motion picture, "Steel—Man's Servant", was shown through the courtesy of the Carnegie-Illinois Steel Corp. All exhibits were conducted so as to be understandable to the layman.

The annual spring outing was held at Karam's Camp on Sunday afternoon, May 24. Baseball and other games were played and refreshments were served. The large number of students and faculty members attending the outing made it a fitting climax to the chapter activities for the school year just completed.

Crystal Formation Related To Practical Performance

Reported by J. T. Ballard
Quaker Chemical Products Co.

Hartford Chapter—The last regular meeting, on May 12, was a sign for a fine turn-out of members. The speaker of the evening was Prof. W. J. Conley, acting chairman of the Department of Engineering of the University of Rochester.

Professor Conley spoke on "Relation of the Internal Structure of Metals to Their Practical Performance"—a most timely subject and one in which the speaker is as well versed, certainly, as anyone in this country.

The speaker started his lecture by showing two of the three reels of the new A.S.M. moving picture, the subject being closely allied to his own. This new A.S.M. movie tells a really fascinating story of crystal formation in ferrous and non-ferrous metals. From there it goes to other phases of metallurgy and certainly proves the statement, "One picture is worth 1000 words."

W. H. Millard, assistant metallurgist, Pratt & Whitney Division, was technical chairman. The new officers of the Hartford Chapter were introduced along with the 1942-43 Executive Committee.

Grinding Wheel Classed as Mechanical Tool, Is Likened to Milling Cutter

Reported by Chas. A. Nagler
Instructor, University of Minnesota

Northwest Chapter—A. Rousseau of the Abrasive Division of the Norton Co., Worcester, Mass., addressed the April meeting on "Practice of Grinding and other Abrasive Applications."

A grinding wheel is a mechanical tool and in many respects is like a milling cutter having thousands of cutting teeth held together by a suitable bond. The ordinary milling cutter has a limited number of teeth which must be sharpened to retain the cutting edge. In the grinding wheel, as the grains become dull they are released from the wheel and others come into place.

There are generally two types of Norton abrasives used for working ferrous metals, namely, Alundum (aluminum oxide) and Crystolon (silicon carbide). Alundum is characterized by being hard and tough where Crystolon is harder and more brittle and low in toughness.

There are three types of bonds used in producing grinding wheels: *(a)* Vitrified bond, *(b)* silicate bond, and *(c)* organic bond.

Under organic bonds we may list the resinoid group, also shellac and rubber bonds. The organic bonds differ from the vitrified bonds in that they are not as rigid and are affected by heat.

Not all materials can be ground at the same rate of speed. Some materials grind slowly and others very fast. In the selection of a wheel for a certain job it should be done on the basis of the physical properties of the metal and not the chemistry of the steel.

The widespread application of grinding in the production of screw threads has resulted in the production of a number of new machines for that purpose. One of the important points to be remembered in grinding threads is that the edge of the wheel must be kept sharp for most thread styles and careful selection must be made in regard to size of the abrasive particles.

The diameter of the individual grains used must be less than the width of the root of the thread being cut. In the grinding of threads speeds of from 10,000 to 12,000 r.p.m. are commonly used. Oil is always employed as a coolant. Wheels are 18 and 20 in. in diameter.

A number of applications of ground threads used in the aircraft and automotive industries were discussed. At the close of the talk Mr. Rousseau led an interesting discussion.

Past Chairmen Honored by Ontario Chapter

Reported by G. L. White
Editor, Canadian Metals & Metallurgical Industries

Ontario Chapter—Honoring the men who have been instrumental in developing the Chapter, the first Past Chairmen's Night was held on April 10 in Toronto.

These men were seated at the head table and introduced to the members. Other distinguished guests at the meeting were W. H. Eisenman, general secretary of the A.S.M., and N. K. Koebel, the speaker of the evening.

Mr. Eisenman told the assembled delegates something about the activities of the Society at large and how the Society has endeavored to be of service in the solution of various war problems by means of inspection courses and the local WPAC's.

Controlled Atmospheres Is Subject

Speaking on "Controlled Atmospheres for Heat Treating Steels" Mr. Koebel, who is director of research for the Lindberg Engineering Co., Chicago, outlined the advantages and disadvantages of various types of atmosphere generators and summarized the conditions necessary to produce a product bright and free from scale.

To prevent decarburization it is necessary to have an atmosphere low in water and carbon dioxide and high in carbon monoxide and nitrogen. In most cases water content is below 1.00%. For high speed steels the water vapor must be as low as 0.06% to prevent decarburization in scale-free atmospheres.

Gas, charcoal generators and endothermic cracking have been used, and each method possesses certain advantages which make it suitable for a particular job. A special charcoal gas generator is used for high speed steels in order to obtain an atmosphere extremely low in water vapor.

Carburization is serious when working with high speed molybdenum steel. The surface wrinkles and the edges become soft by the surface becoming austenitic, thus producing a low Rockwell hardness which is hard to rectify. To reduce costs from breakage and grinding the trade is demanding better atmospheres so that the product can be turned out in close tolerances, bright and scale-free.

Lead Quench Found Best

Excessive breakage will occur when employing an oil quench on high speed steels having a section greater than 1½ in. or having an intricate shape. Experiments with a lead quench at 800° F. have indicated that the lead takes the heat rapidly and evenly, and eliminates the see-saw effects of thermal contractions and expansions caused by an oil quench.

Salt quench at 1100 to 1200° F. has also been used with success, but it is not as effective as the lead quench. Air-cool quench is satisfactory with molybdenum steel under certain conditions, but a soft skin is likely to result because of the decarburization action of the air.

Molybdenum steel may be drawn around 900° but the hardness is sacrificed leading to decreased cutting efficiency. The maximum hardness one can expect of molybdenum steel as quenched is Rockwell C-63 to 64; C-64 to 65 is obtained by drawing at 1025° F., whereas the maximum toughness is obtained at 850 to 950° F. with a hardness of C-62 to 63.

Uddeholm President Was Active in Many Organizations

GOSTA LOFBERG, president of the Uddeholm Co. of America, Inc., New York City, died on May 12 at the age of 46.

Mr. Lofberg was connected with this company since its inception in 1925, with the exception of the three years from 1934 to 1937, when he was president of SKF Steels, Inc. He was a native of Kalmar, Sweden, and came to this country in 1920.

In addition to the American Society for Metals, he was a member of the American Arbitration Association, American Society of Swedish Engineers, American Institute of Mining and Metallurgical Engineers, Army Ordnance Association, American Swedish Historical Museum, New York State Chamber of Commerce, and Swedish Chamber of Commerce.

EDWIN EVANS WIGHTMAN

Edwin Evans Wightman, who died on Jan. 28, was born in Pawtucket, R. I. He attended Massachusetts Institute of Technology and was graduated from Brown University.

After graduation he spent about ten years as draftsman for the Pennsylvania Steel Co. Later he was sales engineer for the Buda Co., Harvey, Ill., and assistant to the sales manager of the William Wharton Iron and Steel Co.

He then entered the Inspection Service of the United States Navy and for the past four years had been senior inspector, Bureau of Ships, U. S. Navy, at the Diesel Engine Division, General Motors Corp., Cleveland.

Employment Bureau

Address answers care of A. S. M., 7301 Euclid Ave., Cleveland, unless otherwise stated.

Positions Open

CHEMIST: Wanted by large Midwestern manufacturer. Analytical background, in iron and steel industry; must be capable of setting up laboratory, including oil and gas analysis and electro plating control. State complete qualifications and salary expected. Box 6-35.

SALES ENGINEER: Chicago. Must be experienced and well known in heat treating field; to represent furnace manufacturer with excellent engineering development and production facilities. Excellent opportunity for right man. Box 6-5.

RECENT GRADUATE in metallurgy for laboratory and field work in connection with furnace development. All details and photograph in first letter. Prominent furnace manufacturer now 100% defense work, but position would be permanent and offers a wonderful opportunity to man who can qualify. Box 5-30.

HEAT TREATER: For plant in central California, to be understudy to man now in charge. Must have technical knowledge of ferrous metallurgy and practical experience to do manual heat treating as required. Box 6-30.

Positions Wanted

METALLURGICAL ENGINEER: Ph.D. degree; experience in plant operation, research and teaching. Desires to be associated with the metallurgy department of a university, teaching and carrying out research, especially in ferrous metallurgy. Box 6-10.

INSPECTOR: Would like position with concern desiring to introduce spark testing into their present, fast-paced, industrial set-up. Six years experience in inspection work—semi-finished, bar stock, forging quality, and castings; also acquainted with mechanical testing equipment; three years experience in spark testing. At present located in Pittsburgh. Box 6-15.

STEEL SALESMAN: Desires connection with mill manufacturing cold-rolled strip steel, spring steel, stainless steel, razor steel, tape steel, band and butcher saw steel, cold-rolled tool steel, spring wires, etc. Can also manage warehouse handling these lines and direct sales, credit or other departments. Can furnish best of references. Box 6-20.

PHYSICAL METALLURGIST: Three years' excellent experience in metallographic and metallurgical work. Expert on nitriding. Desires connection as staff metallurgist or assistant metallurgist, preferably with large firm in position having post-war possibilities. Box 6-25.

Powder Metallurgy Discussed in Talk On Carbide Tools

Reported by John P. Beal, Jr.
Metallurgist, Universal-Cyclops Steel Corp.

Northwestern Pennsylvania Chapter —"Sintered Carbide Tipped Tools" was the subject of the April meeting, and Paul Judkins of the Firth-Sterling Steel Co. was the speaker.

Mr. Judkins opened his discussion with a few remarks about powder metallurgy in general, stating that it has a much greater latitude than regular castings and can be used to produce very pure alloys.

Also, metals that are usually insoluble in one another and metals of widely varying melting points can be alloyed by means of powder metallurgy. Another attribute is that much of the machining necessary on regular castings can be eliminated by making the object to exact size and shape.

Two Types of Bonding Explained

The speaker went on to explain the two principal types of bonding in powder metallurgy. "Particle to particle bonding" is used if the most prevalent metal in the alloy is of the lower melting point; bonding is then caused merely by exerting a pressure of great magnitude on a mixture of the alloying powders.

The second type of bonding is known as "sintering", used if the greater part of the alloy is composed of the higher melting point metal. Bonding by sintering is caused by heating a mixture of the powders to a temperature below the melting point of both materials.

Bonding of both types is caused by the surface cohesive forces of the metals and not by melting.

Tungsten carbide, Mr. Judkins explained, is by far the most widely used powder metal. In the manufacture of carbide tipped tools the sintered tungsten carbide is bonded with pure cobalt by several intricate steps employing pressure and heat to produce a hard cake which is used for the tip of the cutting tool. This tip is brazed or soldered with silver solder onto a steel shank.

Sintered carbide tools have no heat treatment and cannot be annealed; they are intensely hard, varying from Rockwell C-81 to 69 inversely with the cobalt content of the tool.

Because of their hardness, carbide tools can be used for abnormally long periods without re-dressing. This, of course, is of great importance in these days of high speed production.

Zima Talks on Foundry Practice, Alloy Substitutes

Reported by Colin Chisholm
Salesman, Columbia Steel Co.

Oregon Chapter — Fifty-three members and guests were present for the dinner meeting on April 17, and were all presented with a slide rule and paperweight donated by Paul Kullberg of the Industrial Specialties Co.

The first part of the program was covered by an extremely instructive and interesting talkie "Underground Raindrops" produced by the U. S. Electrical Motor Co., and illustrating the manufacturing methods employed.

Guest speaker was Albert G. Zima, of the International Nickel Co., Inc. He talked on recent developments in foundry practice and explained certain pitfalls which should be avoided by engineers in designing castings.

He also spoke of the subject of substitutes of lower alloy content for necessary work at this time when alloys are so difficult to secure.

HERE AND THERE WITH A.S.M. MEMBERS

W. P. Woodside *R. C. Onan* *N. H. Brodell* *J. S. Richards* *J. R. Thompson* *W. R. Kuhn*

WILLIAM PARK WOODSIDE, past president and founder member of the A.S.M., has been made chairman of the board of American Twist Drill Co. of Detroit. He had been president for the past 18 years, a post which is now taken over by WILLIAM F. MURRAY. Mr. Woodside is also vice-president of Climax Molybdenum Co. of Michigan.

* * *

A. H. PEPPER, immediate past chairman of the Montreal Chapter, has recently been promoted to the position of assistant manager of steel sales, Dominion Steel and Coal Corp., Ltd.

Mr. Pepper has been in the employ of Dominion Steel for 30 years, but was on loan to the Canadian Government for the past eight months, working on special duties for the War-Time Shipping Board. He was recalled to fill the new post.

* * *

TWO MEMBERS of the Rockford Chapter recently made new connections. They are CLIFFORD WIGGINS, member of the Executive Committee and the Chapter's educational course instructor for a number of years, and PHILLIP W. CARBAUGH, vice-chairman.

Mr. Wiggins, who was chief metallurgist, Northwestern Steel & Wire Co., Sterling, Ill., becomes special metallurgist for Federal Machine and Welder Co. of Warren, Ohio.

Mr. Carbaugh was assistant metallurgist for Mechanics Universal Joint Co., and has left to become chief metallurgist of the Oliver Farm Equipment Co. at Charles City, Iowa.

* * *

LINDBERG Engineering Co. of Chicago has announced the opening of a new office in Milwaukee. ROBERT C. ONAN, formerly advertising manager of the firm, has been appointed district sales manager. The territory includes Northern Illinois, Iowa, Wisconsin and Minnesota.

* * *

N. H. BRODELL is now metallurgical sales engineer for Copperweld Steel Co. He is a graduate of Carnegie Institute of Technology and was previously connected with the Timken Steel and Tube Division, Pittsburgh Crucible Steel Corp., and the United Alloy Corp.

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S. ALLEN OVIATT, a member of the Cleveland Chapter, who was engineer at Lamson & Sessions Co., has enlisted in the Army Air Corps. He is a first lieutenant assigned to the Industrial Planning Section at Wright Field, Dayton, Ohio.

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RICHARD G. BYRNE, of the advertising and promotion department of METAL PROGRESS, has enlisted for training as an ensign in the U. S. Navy.

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THE NEW district manager of Allegheny Ludlum Steel Corp.'s Cleveland office, W. R. KUHN, has been associated with Allegheny Ludlum or its underlying companies since his graduation from Yale's Sheffield Scientific School in 1914.

Mr. Kuhn started in the New York office of the former West Leechburg Steel Co. and, with two years out for war service, stayed there until 1923. He successively managed the New England office, Pittsburgh district, and Cleveland office, and remained in Cleveland when West Leechburg entered the Allegheny fold in 1936.

Two years later, when Allegheny and Ludlum merged, Mr. Kuhn was made assistant district manager in the Cleveland office of the new corporation.

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SEVERAL personnel changes involving A.S.M. members have been announced by American Steel & Wire Co.

JOHN S. RICHARDS has been appointed director of research in Cleveland and will be succeeded as manager of the metallurgical department by JAMES R. THOMPSON. FLINT C. ELDER, whom Mr. Richards succeeds, has been named research engineer, special assignments for the vice-president. LAWRENCE H. DUNHAM has been made assistant manager of the metallurgical department to succeed Mr. Thompson.

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Mr. RICHARDS attended Carnegie Institute of Technology, where he majored in chemistry, engineering and metallography. His first association with U. S. Steel was as a chemist at the National Tube Co. in 1912.

He was transferred to American Steel & Wire Co. as head chemist at Donora (Pa.) Steel Works in 1928 and two years later was named assistant superintendent of the open-hearth division. In 1934, Mr. Richards was transferred to Cleveland and was appointed manager of the metallurgical department in 1937.

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After completing courses in chemistry and metallurgy at the Y. M. C. A. School, JAMES R. THOMPSON enrolled in a foremen's training course at American Steel & Wire Co. His first employment with the company was in 1901, as a chemist at Newburgh Steel Works, Cleveland. In 1917, he was made assistant chief chemist at the same plant and four years later was appointed chief chemist at Central Furnaces.

In 1929, he was promoted to plant metallurgist at Newburgh Steel, and held various other posts before being made assistant manager of the metallurgical department in 1937.

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Mr. ELDER attended Massachusetts Institute of Technology and Columbia University of Mines, where he obtained his metallurgical engineer's degree. His first employment with the Wire Company was in 1911, as an assistant in the physical laboratory at South Works, Worcester, Mass. He held other similar posts in Cleveland and Pittsburgh before being made chief metallurgist of the company in January, 1934. In February of the same year he was named director of research.

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Mr. DUNHAM was born in Chicago, was graduated from University of Illinois with a B. S. in chemical engineering and metallurgy, and started with American Steel & Wire Co. in 1916 as an assistant in the physical laboratory at Newburgh Steel Works in Cleveland. He has held various other metallurgical positions with the company, having been works metallurgist at Waukegan, Ill., since November 1940.

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OSCAR T. MARZKE, formerly works metallurgist at American Steel & Wire Co's North Works, Worcester, has been named works metallurgist, Waukegan, Ill. WADE B. HOUK has been appointed to succeed Mr. Marzke as works metallurgist at Worcester.

Born in Lansing, Mich., Mr. Marzke attended Michigan State University and Massachusetts Institute of Technology before starting to work for the Wire Company in the physical laboratory at South Works, Worcester, in 1933. He was moved along to various other positions before being named works metallurgist at North Works in 1940.

Mr. Houk was born in New Brighton, Pa., and was graduated from Pennsylvania State College. He worked three years for Republic Steel Corp. before becoming associated with American Steel & Wire in 1936, as a product metallurgist at Worcester, which post he has held to the present time.

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CHARLES E. WILLIAMS has been transferred to Cleveland headquarters of American Steel and Wire Co., appointed to the vice-president's office.

Mr. Williams completed the course for the Bachelor's degree at Grove City College in 1931 and then entered Carnegie Institute of Technology where he received the degree of Master of Science in metallurgy in 1932.

After a brief period of employment with the Latrobe Electric Steel Co., he went to the Donora plant of the American Steel and Wire Co. in 1934 in the capacity of observer in the open-hearth department. He was soon made chief observer and served in that position until 1938, when he was transferred to the physical laboratory as plant metallurgist of the Donora Mills. In April 1941 he returned to the open-hearth department as assistant general foreman, his capacity to date.

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Advertising Age

THE NATIONAL NEWSPAPER OF ADVERTISING

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With salesmen's activities — restricted — the show can serve a more useful purpose than ordinarily. — The buyer needs available information on — products and the industrial show brings him up to date in a hurry. — The trade show will perform a highly valuable service this year for both manufacturers and their customers.

INDUSTRIAL MARKETING

SELLING AND ADVERTISING TO BUSINESS AND INDUSTRY

Exhibits Should Not Be Abandoned

— The industrial exposition provides a convenient meeting place where personal contact may be maintained with least amount of effort and time. — From the buyer's — standpoint, the show enables him to meet — technical men —, which otherwise would be impossible. And if ever the exchange of information and experience was valuable, certainly it is now.

The IRON AGE

Nat'l Metal Congress
War Production Edition
Nat'l Metal Exposition
Cleveland—Oct. 12-16

Foundrymen Set War Goal

Many executives — accomplished more in two days by going from booth to booth than in two weeks of plant calls. — One War Production Board official said that the consulting facilities provided by the exhibitors — advanced the foundry industry's war program at least six months ahead of what it would have been if forced to rely on normal individual contacts — .

Daily Metal Trade

Reg. U. S. Pat. Off. Est. 1909.

ABC "The Newspaper of the Metal Industries" ABP

Trade Convention a Vital Force

The record-breaking attendance at — conventions is a reflection of the — industrialists' desire — to attain efficiency in operation. — Through the exchange of information — and the — spirit of cooperation — the trade convention today is an important and necessary tool.

THE FOUNDRY

A.F.A. Gives Impetus To War Production

Marked success — points way to greater output. — A graphic story — adapted to speeding production. — Difficulties — in showing large — heavy equipment proved no handicap —. Models of equipment, motion pictures, enlarged photographs and drawings were some of the aids in the presentations. — An important part of the job of transmitting information fell to the representatives of exhibitting companies and they were kept busy — .

National Metal Congress & War Production Edition
National Metal Exposition—Cleveland, October 12-16